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JUNE 24, 1950

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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE



Fight Against Fungus

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CHEMISTRY

From Now On: Silicon

Metal, plastic, lubricant and rubber will come from abundant silicon. These compounds may vie with carbon compounds for future rank.

By WATSON DAVIS

Thirteenth in a series of glances forward in science.

► **SAND** is one of the commonest materials on the face of the earth. Until recently it seemed useful only as something for children to play in or to mix with stone or gravel and cement to make into concrete.

Yet locked in sand, and in many other mineral materials, there is silicon, the second most plentiful element on the face of the earth. Silicon constitutes a quarter of the material of the earth. Only oxygen is more abundant, both in the rocks and the atmosphere.

Much of the sand of the earth is silica. Silicon and oxygen are the two chemical elements that make up silica, familiar as quartz.

The element silicon is one of the prime raw materials of nature.

In the future it will play a more prominent role in industry, both as a metal and in compounds.

One of the most promising families of chemicals coming to greater attention has been created by a sort of intermarriage of carbon chemistry with silicon chemistry. The chemistry of carbon compounds is known as organic chemistry and the great array of dyes, drugs, flavors, and many other things chemically created are based upon carbon in its many ramifications.

The chemistry of silicon has not achieved the prominence of organic or carbon chemistry, but it is well on the way. Silicon has been incorporated into a wide array of new silicone compounds in which it is linked up with organic chemicals.

Some of these silicone compounds act like nothing that any chemist has seen before.

There is a fluid that looks like highly refined petroleum oil. When it is analyzed it shows 80% silica. With that much silica, one would think that it should at least solidify when it is chilled, but it does not freeze until it reaches 40 degrees below zero. Other such liquids, which are known by the group name of "silicones," stay fluid at even lower temperatures.

In proportion to temperature variation, silicone liquids change their ability to flow less than any other liquid known. This constancy of viscosity is of great promise when it comes to using them as lubricants in automotive engines. They resist oxidation and they also have good electrical properties.

These liquids can be compounded into greases, that also have no practical change in viscosity with heat. They thus stay put in machinery.

Another silicone is a plastic of unusual properties. Another is a rubber, which looks like ordinary white rubber, bounces, resists water, and yet when burned leaves 90% ash.

Then there is a bouncing putty that can be drawn out into long threads, like taffy, but has a high rebound when made into a ball and bounced.

ASTRONOMY

Collisions Cause Fireballs

► **THE** fireballs that brighten our late October and November skies may be the result of a collision between Encke's comet and an asteroid several thousand years ago.

This explanation was suggested by Dr. Fred L. Whipple, of Harvard Observatory. He spoke before the opening session of the 83rd meeting of the American Astronomical Society, Bloomington, Ind., presenting results of work done in collaboration with Dr. Salah El-Din Hamid, also at Harvard.

These fireballs are bright meteors, bits of matter that burn as they fall through the earth's resisting atmosphere. Dr. Whipple many years ago pointed out that the orbits of the Taurid meteors, as the October-November fireballs radiating from the constellation of Taurus are called, are similar to Encke's comet. The meteors require about 3.3 years to go around the sun, and their orbits have about the same oval shape as that of the comet. The orbits have also the same approximate position in space.

Slight changes in the orbital positions of the Taurid are taking place. These have accumulated over thousands of years to effect a spreading out of the swarm of meteors.

For four well-observed meteors the Harvard astronomers have computed backward and find that their orbit planes coincide reasonably well with that of Comet Encke at an average date 4,700 years ago. Three other orbit planes coincide roughly with each other, but not with Comet Encke, at a time some 1,500 years ago.

These and other probable facts suggest that the Taurid meteor streams were formed chiefly by a violent ejection of material from Encke's comet 4,700 years ago and also by another ejection some 1,500 years ago. In the latter case, however, it may

have been that the ejection came from a second component of Comet Encke that split away before that time and now is no longer observed to be associated with the principal body of the comet.

Dr. Whipple proposed tentatively that the violent ejections were the result of encounters with small asteroidal bodies, and he pointed out that the suggested points of ejection lie in that zone of the solar system where the asteroids or minor planets have their greatest concentration. The asteroids are small bodies ranging in size from several hundred miles for a few of the largest ones down to fractions of a mile for the smallest ones that can be observed.

Some of these new silicones are in industrial use but this new industry is really in its infancy.

For the element, silicon, itself, there is a bright future, too. As a metal it is similar to germanium in its electrical properties, when it is bombarded with atomic particles. From it will be made various electronic devices that promise to be useful.

In the coming years of this element, silicon, it may be expected that:

A. Silicon will appear as silicones in many new kinds of products that will have qualities superior to materials now considered standard.

B. New compounds containing silicon will be made that will rival the whole field of the organic carbon-containing compounds.

C. The metal, silicon, will find new electrical uses as its properties are further investigated.

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PHYSICS

Atomic Age Solves Lost Golf Ball Problem

► **THE** pesky problem of a lost golf ball, plague of all golfers, can be solved by a peacetime application of atomic energy.

Put a minute amount of radioactive material under the cover of the golf ball and equip the caddy with a Geiger counter. When a ball disappears, its location will be signalled to the caddy by light flashes or clicks of the Geiger counter.

Such an "atomic" golf ball was demonstrated in Brecksville, Ohio, at B. F. Goodrich Research Center by Dr. William L. Davidson, director of physical research, who developed the ball. Signals can be received by the counter although the amount of radioactive material inside each ball is so small that there is no danger from radiation, he states.

Of the 25,000,000 balls sold each year, it is estimated that about one-half are lost.

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MILITARY SCIENCE

Anti-Tank Weapons

Light new weapons which can be carried by a few foot soldiers can stop the heaviest tanks. This gives the greater advantage to the defense.

► DUE to new use of explosive forces, light new weapons carried by a few foot soldiers are scheduled to stop the heaviest enemy tanks when and if war comes in western Europe.

Bazookas came into their own in World War II through the use of a trick type of projectile. It had a hollow shaped front end that sort of focused the explosive effect so that a hole was blown into thick armor by a relatively slow-moving, gentle hit.

Now there has been perfected a hollow charge type of projectile so that it is bigger and better. It can be fired with greater accuracy from recoilless weapons, also a late World War II development. These have no kick at all because the firing charge squirts backward to offset the push given the missile.

The hollow charge projectile does not keep on its path by whirling speedily like a conventional artillery shell. It is guided by tail fins, much like aerial bombs. It moves more slowly and its penetration into a tank is due to the explosive, not to the punch of the propelling charge from the recoilless gun. The timing of the explosion is tricky and must be precise.

While the hollow charge projectile is supposed to stem from German war research, it is based upon the Monroe effect,

discovered about 50 years ago by the late Dr. Charles Edward Monroe, inventor of a smokeless powder and George Washington University chemist.

The other anti-tank projectile of great promise is a squash shell, which actually does its damage to a tank without making a hole in it. When the projectile hits at just the right angle the explosive is spread or squashed over an area on the outside of the armor and is then set off. A violent shock wave results so that a chunk of the metal inside the tank is spalled off, creating havoc within.

Russia is known to have about 40,000 tanks, some of them formidable heavies, unmatched by similar vehicles of any of the Atlantic nations.

The new anti-tank weapons under development now will make it unnecessary to match these tanks, for defensive purposes.

Light tanks or infantry should be able to stop a tank assault through the use of the new anti-tank weapons. There seems to be a feeling that the advantage for the present is with the defense and not the attack. This is the best situation for stemming an assault from behind the iron curtain.

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MEDICINE

Antihistamine vs. Fungus

One of the antihistamine chemicals has given dramatic results in relieving athlete's foot. Its effectiveness against this fungus was discovered accidentally.

► AN ANTIHISTAMINE chemical which relieves athlete's foot suffering immediately and starts skin healing within 24 hours has been discovered by Capt. Layne E. Carson and Miss Charlotte Campbell, who are shown on this week's cover of SCIENCE NEWS LETTER, of the Army Medical School in Washington (SCIENCE, June 23).

The chemical has the trade name of diphenylpyraline. It was synthesized by Drs. Lawrence Knox and Roland Kapp of Nopco Chemical Co., Harrison, N. J., in the course of a long-range research project of pharmaceuticals.

Whether the chemical actually kills the fungus and whether it is the antihistamine or another part of the chemical that is active are questions still to be answered.

Its effectiveness in athlete's foot and other

ringworm infections was found after an accidental discovery by Capt. Carson of the effectiveness of another antihistamine, pyribenzamine. He was suffering from a bad case of athlete's foot himself last winter. One night in March, the infection became so painful he could not sleep.

In desperation, he looked around for something soothing to put on his foot. He had previously tried all the standard remedies without relief. His eye fell on a jar of salve containing pyrabenzamine and he decided to try it. He fell asleep. The next morning the pain and swelling were gone and the following day only a slight scaliness was left to show where the infection had been.

Exploration of this and other antihistamines followed. Miss Campbell, already

working on fungus infections, joined Capt. Carson in this research. Test tube and plate trials showed that pyribenzamine stopped the fungus growth, much as penicillin stops other kinds of germs. Diphenylpyraline was even more effective. And a dozen patients with stubborn cases of athlete's foot got the same dramatically fast relief Capt. Carson had.

The pain and itching are relieved, the swelling, inflammation and "weeping" clear up and the cracks in the skin begin to heal. But Capt. Carson and Miss Campbell are by no means sure, because the work is all so recent, whether the patients are "cured" or whether the fungus is still alive in their skin and will flare up again.

To learn more about the action of this antihistamine they will put on a large scale Army field test among U. S. troops stationed in Puerto Rico beginning early in July. Patients will be treated every day for 30 days, with before and after tests to detect the fungus at start of treatment and, if it has not been killed, at the end.

If the chemical proves a cure for athlete's foot, it is expected to be effective also in ringworm of the scalp, barber's itch and other related fungus infections.

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PLANT PATHOLOGY

All 48 States in Plant Disease-Warning Network

► PLANT scientists in 48 states will take part this summer in the U. S. Department of Agriculture's "U. S. Plant Disease Warning Service." They are the country's warning wardens for crop troubles.

For the first year, all states in the country will be represented in the service.

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INSIDE THE MILK INDUSTRY— Ion exchange columns in the chemical laboratory of the new National Dairy Research Laboratories are the apparatus used to remove mineral salts and acids from whey. These laboratories are at Oakdale, Long Island.

GENETICS

Congenital Hip Disease

► CONGENITAL dislocation of one or both hips afflicts six out of every 100 Indians at Island Lake, a settlement 150 miles east of Norway House, Manitoba, Canada, and 300 miles northeast of Winnipeg.

Dr. Cameron Corrigan, medical superintendent of Norway House Indian Hospital, Norway House, Manitoba, Canada, reports that he had "never seen so many cripples all gathered together in one place outside of a hospital."

The condition is hereditary, he believes from studies he has made. Neither nutrition, occupation, racial customs, sex or birth injury seem to play any part.

Females are affected much more than males, in the ratio of 6.5 to one. There were five cases of dislocation on both sides to every six cases of one-sided dislocation.

"Some crawled on their hands and knees, some hopped about like clowns, others waddled like ducks," is the description of these afflicted Indians given by Dr. Corrigan and his summer assistant, Sidney Segal, Queen's University medical student, in a report to the Canadian Medical Association.

"All accepted with typical stoicism their misfortune as life's lot. They knew no different. Nature had exacted another toll."

Dr. Corrigan first saw these Indians and was struck by the number of cripples among them when he went to Island Lake in the summer of 1940 as government doctor at the annual treaty payments.

During the period 1940-1949 a large tuberculosis program was introduced by the Indian Affairs Branch when the obvious cases of tuberculosis were weeded out. But it was not until the summer of 1949 that a survey could be made of the cases of congenital dislocation of the hip.

In the population of 1,253 Indians at Island Lake, the condition was diagnosed in 45 persons ranging in age from two to 74 years. There is evidence of other cases not examined, Dr. Corrigan reports, that would bring the total to 71 living persons, or six percent of the total population.

When those no longer living but suspected of having the disease were included, the total was 94. Every one of them is connected by blood relationship.

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PUBLIC

Greece Wipes Out Malaria

► THE number of cases of malaria in Greece has been reduced from 2,000,000 to 50,000, or by almost 98%. This was done through a planned attack on malaria with the cooperation of the Public Health Division of the ECA mission to Greece, according to Dr. Oswald Hedley, who headed the division.

Dr. Hedley spoke as guest of Watson Davis, director of Science Service, on the nation-wide Columbia network.

Pointing out that malaria had long been a chronic disease problem in Greece, Dr. Hedley told how the successful fight against the disease has had a significant effect on the economic life of the country.

"Already, farm production in some areas," he said, "has increased almost 40% as a result of the conquest of malaria."

Defeating malaria is much cheaper than trying to treat it. Before the war, Dr. Hedley said, the Greek people consumed more

than one-fifth of the entire world output of quinine at an annual cost of \$1,300,000.

"Today, as a result of our campaign," he went on, "Greece spends \$300,000 for DDT, which is used to kill the deadly malaria-carrying mosquitoes."

Now that malaria has been conquered, tuberculosis is the prime health problem in Greece, according to Dr. Hedley. That disease, he said, is being tackled through the construction of new hospitals, testing and vaccinating children for tuberculosis and X-raying hundreds of thousands of people.

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PUBLIC HEALTH

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ASTRONOMY

Star Systems' Differences

Some systems of stars are associated with clouds of dust and gas and others are not. Lack of interstellar matter is a result of collision between galaxies.

► COLLISIONS of galaxies were proposed at the American Astronomical Society meeting in Bloomington, Ind., to explain why some systems of stars are associated with clouds of dust and gas and others are not.

The proposal was made in a joint paper by Dr. Lyman Spitzer, Jr., director of Princeton University Observatory, and Dr. Walter Baade, of Mount Wilson and Palomar Observatories.

Our own Milky Way system is a galaxy of stars, perhaps 100 billion of them. It also contains vast amounts of dust and gas, but this dust and gas is not distributed uniformly. Wherever the dust and gas abound, however, young, very bright stars are found, while in other regions, such as the center of the galaxy, neither young stars nor interstellar material are observed.

Similarly, it has been found that other galaxies of stars are of two types, those which have dust and gas and contain hot, young stars, and those which do not. There are clusters of galaxies, too, and some years ago it was found that the galaxies occurring in clusters were systematically different in nature from isolated ones.

If an isolated galaxy is shaped like a flat disk, as is our own Milky Way, it almost always contains gas and dust—tiny solid particles drifting about between the stars. Within compact clusters of several thousand galaxies, however, practically none of the flattened systems have any appreciable amount of interstellar matter and no bright young stars.

The Princeton and Mount Palomar astronomers suggest that this lack of interstellar matter in cluster galaxies is a direct result of collisions between galaxies. The stars in each galaxy are, however, so far apart in relation to their sizes that virtually no direct collisions between stars will occur when two galaxies meet head on, but the dust and gas particles will be unable to meet undisturbed and they will suffer a "catastrophic collision."

The gas temperature will rise to many millions of degrees, increasing tremendously the individual energy of each gas and dust particle so that they will dissipate into intergalactic space. After such a "passing through" each other, the star system of each galaxy will be little affected, but the interstellar matter will be "cleaned out" between them and left as an expanding cloud between the galaxies as they separate.

Detailed calculations show that in a compact cluster one galaxy will collide with some 25 others during the roughly three billion years since all the galaxies were

presumably formed. Galaxies like our own, however, which are not in compact clusters, have had few, if any, collisions and have been able to retain their interstellar matter, which produces the bright and dark nebula so characteristic of our own Milky Way system.

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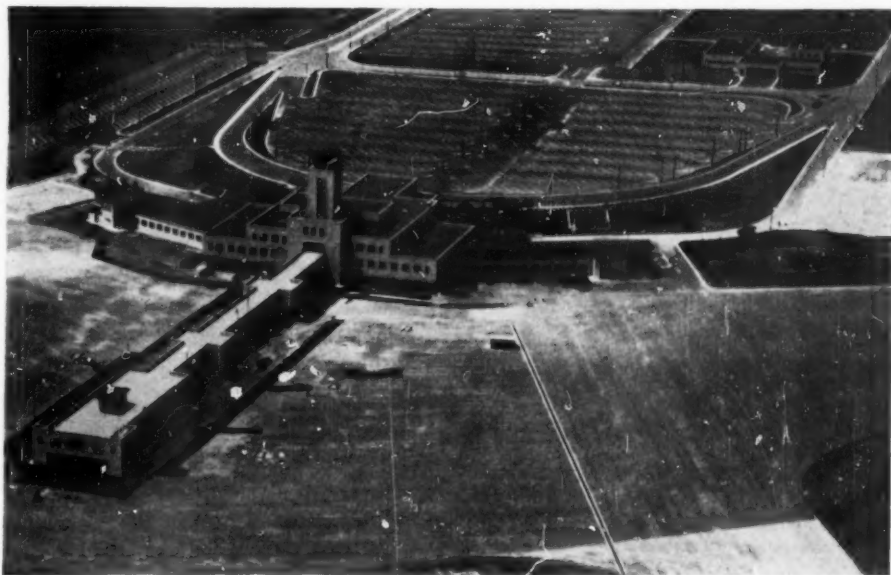
AERONAUTICS

Passengers Will Not Touch Ground in Boarding Planes

► PASSENGERS will not touch the ground in boarding airliners at Baltimore's new Friendship International Airport a few years hence.

"Piers" of new design extend out from the terminal building along which the "berths" of the airplane are located. Wall openings are made so that gangplanks of new design for later installation will allow the passenger to walk directly from the elevated corridor of each pier directly into the airplane without climbing down steps and up usual loading devices.

When the airport is put into service after June 24, conventional loading methods will be used, but the newer equipment will be installed as soon as airlines are ready to use it.



FRIENDSHIP INTERNATIONAL AIRPORT—Baltimore's new airport, dedicated June 24, is shown above. Four times as big as LaGuardia Field in New York, it is located in an area which has dense fog only five days out of the year.

Planes are serviced at the ground level from fully equipped pits that contain electrical motor starting facilities as well as air-conditioning, both cool air for summer and warm air for winter, provided by permanently installed facilities.

Eventually the fuel lines and other servicing facilities will be run underneath the new style gangplanks so as to leave the apron below the plane uncluttered.

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ENGINEERING-POPULATION

Southwest Is Boom Area In People and Electricity

► WORLD War II more than doubled the use of electricity in the southwestern corner of the nation—California, Arizona and southern Nevada—the American Institute of Electrical Engineers was told in Pasadena, Calif.

From a long range look, the southwest has tripled its population in 30 years, and boosted its use of power seven times, Harry A. Lott, California power engineer, said in a paper outlining the expansion of the electrical systems of the three-state area.

Tremendous increase in industrialization, irrigation pumping and air-conditioning were cited as the reason for the greater power need. Population in the area jumped from 3,900,000 in 1920 to an estimated 11,500,000 in 1950. Meanwhile, use of electricity increased from 4,000,000,000 kilowatt hours in 1920 to 29,200,000,000 in 1949.

Since 1940 alone, capacity of the Southwest's power plants jumped from 4,000,000 kilowatts to an estimated 8,333,000 by 1952.

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ARCHAEOLOGY

Papyrus Book Collection

Manuscripts containing the entire religious literature of the Gnostic sect, previously believed lost, promise to comprise the most impressive of book collections.

► **DISCOVERY** of what a French archaeologist pronounces to be "the most impressive collection of books on papyrus that has ever been seen" is announced in the journal *ARCHAEOLOGY* (Summer 1950).

The library of 48 religious texts written in Coptic of the third and early fourth centuries A.D., is bound in 13 volumes, bindings and pages in excellent state of preservation. This find is especially precious to scholars because the manuscripts apparently contain the whole body of religious literature of the Gnostic sect, previously entirely lost.

Little has been known of this sect or rather group of sects who boasted of having the "perfect understanding" or "gnosis." Scholars have had to guess at their religious beliefs from the confused citations in the attacks by pagan and Christian authors who were often biased or ill-informed.

The 1,700-year-old manuscripts are declared to be without doubt the most ancient

documents of written Coptic that we possess or could hope to possess and are the most remarkable ancient library known.

The story of how these books were found in an unlikely spot that never has attracted scholars and the devious manner by which they finally reached the safety of the Coptic Museum in Cairo is told by Jean Doresse, curator of manuscripts of the Museum of the Louvre.

The original find was not made by archaeologists, but by peasants unable to realize the value of what they had turned up. Digging at the foot of a mountain called Gebel et-Tarif, situated about 30 miles north of Luxor, the peasants discovered a jar filled with manuscripts.

There is a story that some of the precious manuscripts were burned to heat tea. The others were sold for a few coins to local merchants. Some of the pages were shown

to a Coptic priest who tried unsuccessfully to read them. Then, in various clandestine ways they were carried to Cairo and offered to dealers in antiquities.

One manuscript was, by chance, offered to Togo Mina, director of the Coptic Museum, who instantly perceived its value and bought it without delay. This was a book of more than 130 pages, complete with soft leather binding. It was written in Coptic, language of ancient Egypt, and could be dated as being of the early fourth century.

Of the remainder of the manuscripts which had reached Cairo, three of the finest had been offered privately for a very small price to a well-informed scholar. But he failed to buy them or even to bring them to the attention of a competent organization. After that they disappeared completely.

For two years nothing more was heard of the treasure. The best informed people refused to believe that the documents had ever existed or else they considered them irretrievably lost.

Just how their trail was at last rediscovered and how they reached the Coptic Museum, Dr. Doresse is unable to divulge pending negotiations for their purchase, but he reports that a "private person" saved them and has agreed to let the museum have them in the interest of science.

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MEDICINE

Penicillin Plus Eye Drops Advised for New Babies

► A "SHOT" of penicillin into the muscles plus silver nitrate dropped into the eyes of newborn babies is the method for preventing gonorrhea eye infections advised by two New York physicians in a report to the *JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION* (June 17) in Chicago.

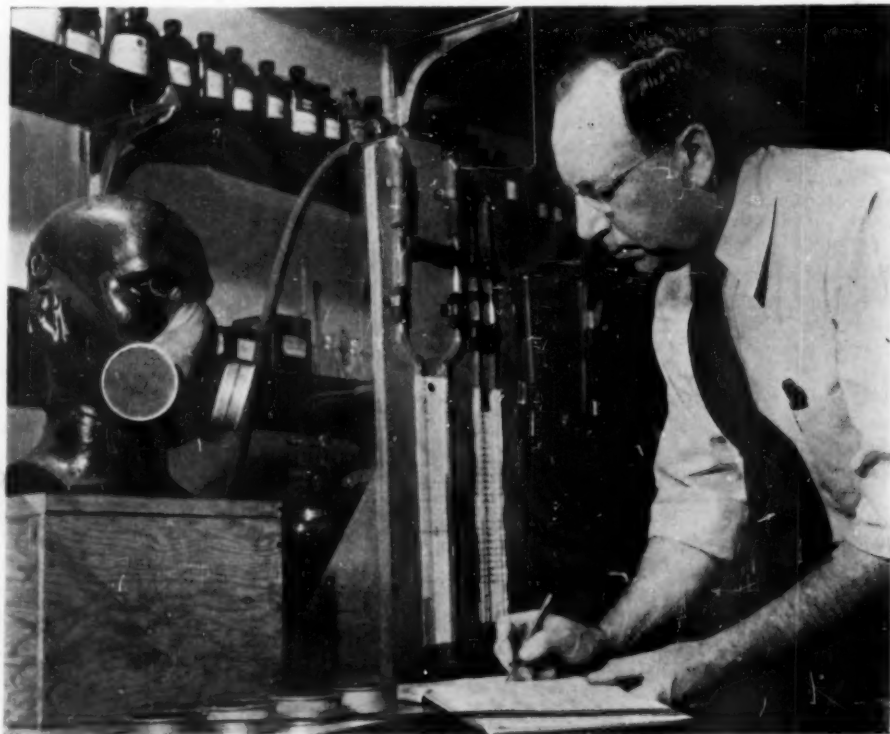
The physicians are Drs. Samuel G. Watts and Morris M. Gleich of Harlem Hospital.

During the year June 1, 1948 to June 1, 1949, this prophylactic treatment was given 4,565 new babies. Not one developed the eye infection, sometimes popularly known as babies' sore eyes.

During the three preceding years, 1945-1947 inclusive, silver nitrate drops alone were used. In 1945 among 2,628 babies there were three cases of the eye infection. In 1946 there were eight cases in 2,916 babies and in 1947 there were 11 cases in 4,186 babies.

Silver nitrate eye drops have been used to prevent gonorrheal infection of babies' eyes since 1881. Since the discovery of the sulfa drugs and penicillin, there has been considerable difference of opinion among physicians as to whether these newer chemical remedies would be effective in place of or combined with silver nitrate. The Harlem Hospital physicians, on the basis of their experience, now advise the penicillin-silver nitrate combination.

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SAFETY FIRST—In one of the departments of the world's largest safety research laboratory recently dedicated in Pittsburgh by the Mine Safety Appliances Company, a model head is used to test efficiency of respirators that protect workers against hazardous dusts and fumes. Other departments develop gas masks, protective hats, gas warning and detection instruments, underground lighting systems and rescue and protective apparatus of all kinds.

ASTRONOMY

Scorpion Crawls in Sky

The constellation of Scorpius, most characteristic group of summer, appears in the southern sky. Mars, Saturn and other planets may also be seen.

By JAMES STOKLEY

► LOW in the southern evening sky in July there appears the constellation of Scorpius, the scorpion, perhaps the most characteristic star group of summer. Its position is shown on the accompanying maps, which give the heavens as they appear about 10:00 p. m. EST at the first of July, an hour earlier at the middle of the month, and two hours earlier at the end. (Add one hour if you are on daylight time.) The brilliant red star, called Antares, is supposed to mark the scorpion's heart. The row of stars that curve downward from Antares to the left, and then up into a hook, forms the tail.

Antares, however, is only one of six stars of the first astronomical magnitude that may now be seen. Brightest of all is Vega, in Lyra, the lyre, which is high in the east. Only a little fainter is Arcturus, in Bootes, the bear-driver, which is high in the southwest. Third is Altair, in Aquila, the eagle, in the southeast. Next comes Spica, in Virgo, the virgin, to the southwest, below Bootes, but because it is near the horizon, Spica looks fainter than normal. Sixth is Deneb, to the northeast, in Cygnus, the swan.

Mars and Saturn Visible

The planet Mars is also in the sky, just to the right of Spica, and about 60% brighter. Farther right, and even nearer the western horizon, is another planet, Saturn, which is considerably fainter.

Some other constellations that are prominent, even though they contain no first magnitude stars, are seen to the south, near and above Scorpius. Just to the left is the constellation of Sagittarius, the archer, of which some of the principal stars are arranged in the shape of a teapot. The six stars in the left-hand part of this group, that form the handle of the teapot and the top of the lid, also make a dipper. This is often called the "milk dipper," and it is the third of these implements that we can see in the sky. The other two are the big dipper and the little dipper, to the north, in the constellations of Ursa Major, the great bear, and Ursa Minor, the lesser bear.

Above Scorpius are two constellations closely associated. One is Ophiuchus, the serpent-bearer, and the other is Serpens, the serpent that he is carrying. Unlike any other constellation, Serpens is divided into two parts—the head, to the right, near Bootes, and the tail, which extends toward Aquila.

Continuing upwards, we find Hercules, the champion, almost directly overhead and

just west of Vega. Six of its stars form a somewhat distorted letter H. These same stars are also considered sometimes as forming a rather un-Herculean figure of a butterfly. The cross-arm of the H, which runs approximately east and west, is the body of the insect, and the upper and lower halves are its wings. Immediately west of Hercules, toward Bootes, is the pretty little constellation of Corona Borealis, the northern crown, a semicircle of stars.

In addition to Mars and Saturn, two other planets may be seen later on July nights. By midnight at the beginning of the month (and earlier as it advances) brilliant Jupiter will be visible to the southeast in Aquarius, the water carrier, the first part of which is shown on the map. Venus, still brighter, is in Taurus, the bull, and rises in the southeast about 2½ hours before the sun. At the end of July Mercury sets after sunset, but not late enough to be visible.

Globular Cluster in Hercules

Under really fine conditions, on a dark night when Hercules is overhead, it is possible to see in that group with the naked eye a faint, hazy spot of light. It is between the two stars which form the upper right side of the H, as viewed from the south, and about a third of the distance from the top star.

A pair of binoculars, or even of opera glasses, will show this hazy spot a little better but a telescope of at least moderate size is needed to show what it really is—a huge globular cluster made up of thousands of stars. It is generally known as "the great cluster in Hercules," or as M. 13, after its number in a famous catalogue of clusters and nebulae prepared many years ago by a French astronomer named Messier.

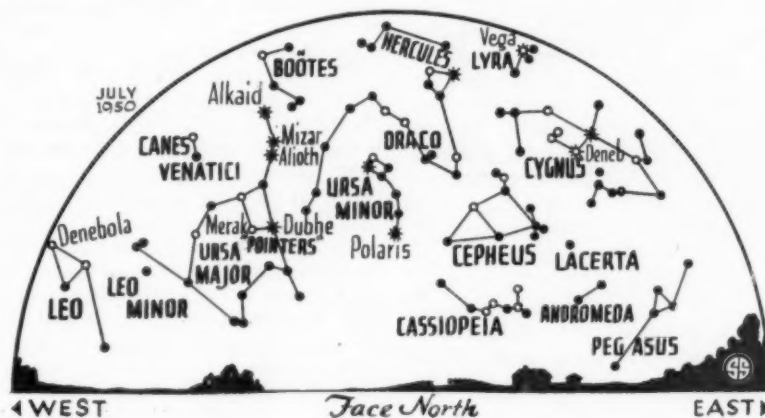
The Hercules cluster, which contains at least 50,000 stars, is the finest example visible to northern observers of a globular star cluster, of which nearly a hundred are known. They have a very peculiar distribution in the sky, since nearly all of them are in one half—that toward the constellation of Sagittarius, the archer. While they congregate near the Milky Way, not one of the clusters is in its middle.

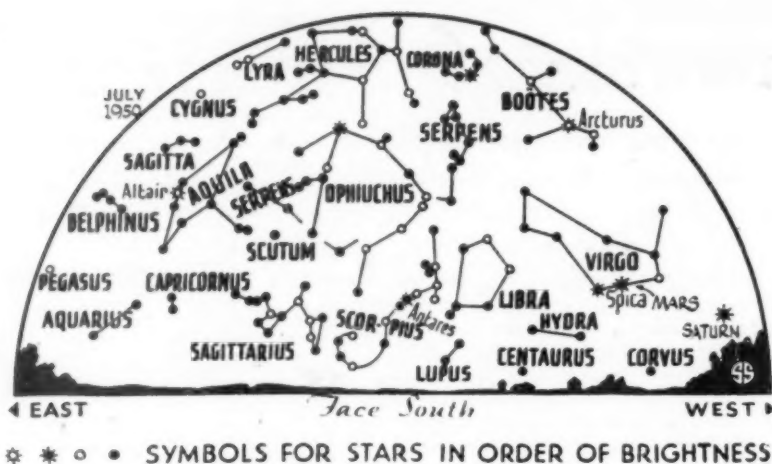
Shapley's Study of Clusters

A now classical study of the globular clusters was carried on in the year, 1916-1919 at the Mt. Wilson Observatory by Dr. Harlow Shapley, a young astronomer, who was destined to achieve fame later as the director of the Harvard College Observatory. He found in them many variable stars of the Cepheid type. These change regularly in brightness in a characteristic manner, brightening rather rapidly, but dimming more slowly. The cluster variables generally go through this cycle in less than a day, though Cepheids in other parts of the sky have longer periods. But the important thing is that the longer the period, the greater is the average brightness of the star. Thus, by timing the variations of such a star, it is possible, as a result of these researchers pioneered by Dr. Shapley, to tell its actual luminosity or "candlepower." Knowing the law of diminution of brightness with distance, one can then determine how much farther away one Cepheid is than another. Furthermore, if by independent means we can find the actual distance of a few such stars, it then becomes possible to tell the distance of all the Cepheids. This has actually been done.

Clusters as Measuring Sticks

Thus, they have become important measuring sticks of the universe, and their first important application was on the globular clusters. The nearest is one known as omega Centauri, visible from southern countries in the constellation of Centaurus, the centaur, as a hazy, fourth-magnitude star, easily seen with the unaided eye. Its distance is such that its light, travelling 186,000 miles every second, takes about 21,000 years to reach the earth. The distance of M. 13 is





about 35,500 light years, i. e., its light takes that long to reach us. The most distant globular cluster is at the enormous distance of 230,000 light years.

With their distances known, it became possible to find the actual arrangement of the globular clusters, in relation to the Milky Way, which is a flattened disk of stars, the Galaxy, about 100,000 light years in diameter. The globular clusters are distributed through a spherical region of space, of about the same diameter and with approximately the same center. Since the solar system is not at the center of the Galaxy but toward the edge, we are also near the outer shell of the system of clusters, and that is why they are nearly all seen in the half of the sky toward Sagittarius, which is the direction of the center of both systems.

ENGINEERING

Line-of-Sight Radio Waves

► HIGH frequency microwave radio, already being used to transmit telephone conversations like a beam of light, has opened a whole new field of communications, the American Institute of Electrical Engineers was told in Pasadena, Calif.

Wartime developments in new electronic tubes have enabled utilization of new radio frequency bands, R. V. Rector of General Electric and W. E. Sutter of International General Electric Co. reported. The vast U. S. communications networks, already using telephone lines, power cables and conventional radio channels to the extent where expansion is extremely difficult, are turning to microwave channels as a fourth way to send signals through space.

Microwaves are like radar. They travel in straight lines, like beams of light. Thus transmitter and receiver must have a line-of-sight path between them, or relay stations to bend the signal beam over or around hills and mountains.

A typical installation, carried out as a test program by the Pennsylvania Electric Co. and Westinghouse Electric Corp., connects a generating plant at Seward, Pa., and P. E. C.'s headquarters at Johnstown, Pa. It was described at the convention by D. R. Pattison of Pennsylvania Electric and M. E. Reagan, S. C. Leyland and F. B. Gunter of Westinghouse.

The microwave beam carries seven signal channels, in a system known as "multiplexing." It covers 12 miles between Johnstown and Seward, over hilly country, by being bounced off a novel aluminum reflector at the top of one rise (See SNL, May 27, p. 325).

The engineers said the equipment was "entirely satisfactory." Conventional telephone lines, on the other hand, have not done their job as well in the past, at least for this particular company. They fell prey to landslides, ice storms, automobile accidents and gunshots.

Science News Letter, June 24, 1950

ENGINEERING

New Insulation for Motors Of Electric Locomotives

► A NEW type of electrical insulation made of glass fibers and silicone rubber was described to the nation's electrical engineers in Pasadena, Calif.

The special material was developed to cut damage to the giant motors of electric locomotives from continual vibration at high speeds.

Tests on the insulation described to the American Institute of Electrical Engineers by J. Ross Reed of the National Electric Coil Co., Columbus, Ohio, and J. J. Tyner of the Dow-Corning Corp., Los Angeles.

Older forms of insulation have been the weak link in locomotive motors, they said. High temperatures and constant pounding soon lead to failure of insulation around field coils.

The new silicone rubber tape stays resilient at high temperatures, the engineers stated. One major U. S. railroad re-insulated 300 coils with the new material during the tests. Not a single failure has been noted so far.

Science News Letter, June 24, 1950

MEDICINE

ACTH Patients Will Get Special Diet

► PATIENTS getting ACTH for their arthritis may in the future also be put on a diet providing a lot of cereals, vegetables and peas, beans and nuts.

Such a diet, because of its high potassium content, might help to counteract some of the undesirable effects of the potent anti-arthritis hormone, studies at the University of California Medical School in San Francisco suggest.

The research, so far limited to rats, is reported by Dr. Leslie L. Bennett, associate professor of physiology and associate professor of general medicine, and John E. Whitney, graduate student, to the Federation of American Societies for Experimental Biology.

Giving ACTH stimulates the cortex, or rind, of the adrenal gland. Among the biochemical changes that follow are a breakdown of body tissues, liberating nitrogen and potassium. As a consequence, animals or humans lose weight.

The body's utilization of potassium is intimately related to the adrenal gland. With this in mind, the California researchers gave rats diets abnormally high in potassium and then injected ACTH. The potassium halted the loss of nitrogen from the body and there was no loss of weight.

The implications of these findings are now being investigated.

Science News Letter, June 24, 1950

MEDICINE

Blood Is Jaundice Hazard

► A WARNING to human blood handlers to protect themselves against the danger of accidentally getting infectious jaundice from the blood is issued by two California physicians in the JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION (June 17), Chicago, Ill.

Thousands of persons throughout the world may face this danger, they state.

The physicians are Dr. Clifford Kuh of the Permanente Hospitals, Oakland, and Dr. Walter E. Ward of the Cutter Laboratories at Berkeley. These laboratories process plasma and other blood fractions, among other activities.

The kind of infectious jaundice due to a virus and called virus hepatitis occurred in seven of the Cutter Laboratory employees. Three cases were in 1946-1947 and four in 1949. All of them were working with blood, plasma and its derivatives. Drs. Kuh and Ward consider them cases of occupational jaundice, believing that the workers were exposed to the virus in the course of their work. It is known that this virus exists in the serum of blood from some persons and that it can be transmitted to others by injections of such serum. There is no practical way of telling whether human blood contains this virus.

An accidental pinprick or scratch may also open the way to entry of the virus if blood or serum containing it gets onto the scratched or pricked skin. In addition, the virus may be inhaled, especially if blood containing it is dried, the California physicians believe. They think some of their cases acquired the disease in this way.

Physicians, nurses, technicians and any other persons handling human blood in any laboratory, hospital or clinic may be exposed to this jaundice danger.

Protective measures advised by the California physicians are:

1. Wash from the hands any blood from another person which might be contaminated.
2. Wear rubber gloves when drawing blood from a person known to have virus hepatitis.
3. Any person knowing he has accidentally contaminated himself with potentially dangerous blood or serum might be advised to take an injection of immune globulin, which is a kind of "shot" for protection against the virus.

Prophylactic "shots" of this immune globulin are now given periodically to Cutter employees exposed to the danger of virus hepatitis in the course of their work.

Where dried blood fractions are being manufactured, the physicians advise proper precautions to protect workers from inhaling potentially infectious material.

The jaundice danger reported by Drs. Kuh and Ward and measures for protection against it relate specifically to human blood

handlers. Methods of protecting persons getting blood transfusions, vaccines and injections of blood fractions, they point out, are well recorded and known to most physicians.

Science News Letter, June 24, 1950

PHYSICS

Scrap Iron in Cement for Radiation Protection

► BETTER protection from atomic radiation, hazard near atomic installations, is given by a mixture of cement, scrap iron and limonite, an iron ore.

Drs. P. C. Gugelot and M. G. White of the Palmer Physical Laboratory of Princeton University in Princeton have discovered that a three-foot wall of iron and limonite concrete is 280 times as effective as ordinary concrete in stopping neutrons and 20 times as effective in stopping gamma-radiation.

The scrap iron-limonite concrete has satisfactory mechanical properties for structural purposes. It is, however, more expensive than a concrete made entirely of limonite so that the limonite concrete could be used where cost was a limiting factor.

They report their findings in the JOURNAL OF APPLIED PHYSICS (May, 1950).

Science News Letter, June 24, 1950

ASTRONOMY

Sky Path of Unusual Stellar Object Plotted

► AN UNUSUAL stellar object has now had its path through the sky determined. Most probably an asteroid, it is very fast moving and has both a high inclination and a high eccentricity.

The information on where the object will be in the sky was bulletined to astronomers by Harvard College Observatory in Cambridge, Mass. The path, or orbit, was computed by C. Jackson.

The object, of magnitude 12, was dis-

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WYOMING

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Paton Ranch will give you trout fishing in a mountain stream as it flows out of a canyon in the Big Horn Mountains, daily horseback rides along the picturesque trails and excellent food—most of which is grown on the ranch.

The region abounds in geological and historical interest—dinosaur bones, marine fossils and Indian implements are found nearby.

Write for folder—Paton Ranch, Shell, Wyoming.

covered by E. L. Johnson of the Union Observatory at Johannesburg on May 22. On May 24 it made its closest approach to the sun. It is located too far south to be seen from this hemisphere and is too faint to be seen without a telescope.

Johnson's object has an inclination of 57 degrees with the plane of the earth's orbit. This is one of the highest inclinations ever reported for an asteroid. The high eccentricity means that its path is far from being elliptical, the normal path taken by asteroids.

Science News Letter, June 24, 1950

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Pelican

► PELICANS are large grotesque birds with comical faces and a remarkable talent for fishing. But the most characteristic feature of this bird is its expandable mandible—the pouch hanging below its lower bill.

Thanks to this unique pouch, the pelican is one of the most readily identifiable of the birds. Watch people at the zoo. They all know eagles, and they can usually spot owls with accuracy. But before most of the other birds they will pause a moment, then read off the identification card, and then say to their companion, "Oh, that's an egret," or perhaps, "So that's what a coot looks like."

Before the pelican cage there is no such hesitation. Someone in the party will cry out, "A pelican. Look at the pouch." And then sure as fate someone is bound to intone:

"What a wonderful bird is the pelican,
It's pouch can hold more than his
bellycan . . ."

There is usually a bemused silence while everyone within earshot strains to recall the rest of the limerick. Everyone stands still, head cocked like a perching bird's, and then the tag-end of verse comes swimming into someone's mind, to be voiced immediately:

"It can hold in its beak
Enough food for a week . . ."

And then the dam bursts and everyone shouts the last line so noisily that you can never be sure quite how it goes:

"da-da-da perfectly well he can," or something like that.

The pelican uses the pouch as a fish net. Flying along over the water, a pelican will spot a tasty bit of seafood in the briny beneath. It will immediately go into a swift dive downwind, smack the water with an awkward splash, sometimes turning a complete somersault in the water. Seconds later it will come flopping out of the water, taking off into the wind this time. Its pouch will be distended with the bulk both of its prey and the water it was swimming in at the fatal moment.

The pelican can expand or contract the

pouch at will. After it has caught a fish, the pelican will let the water run out of its beak, contract the pouch, and swallow the fish.

A diving pelican hits the water with great force. It is equipped with air pockets under the skin of its forward underbody which act as shock absorbers.

ARCHAEOLOGY.

Viking Tower Colonial

► A FOOTPRINT discovered during archaeological excavations of the famous Old Mill or Viking Tower of Newport, R. I., has helped prove that it dates from not earlier than the 17th Century colonial period, a report to Archaeological Institute of America in New York declares.

Solving the mystery of the age of the controversial tower, Dr. William S. Godfrey, Jr., Harvard archaeologist, in his second season of digging, dealt a blow to the romantic idea of early Viking settlements in New England. The famous tower is not of Scandinavian, Viking, Irish or other origin, but was built by the British colonial Governor Arnold or one of his contemporaries.

Digging beneath the columns of the tower, Dr. Godfrey found that a layer of colonial brown earth passes under four of these columns. In this earth he found various evidences of the colonial period, including a gunflint.

The footprint discovered was that of one of the workmen who dug an original construction trench several hundred years ago. This trench was excavated to receive the foundations of the tower. A rusty nail, a fragment of hand-blown flat glass and two

Pelicans are gregarious birds. They usually nest in colonies along a sea coast or a lake shore. They fish together in flocks, sometimes even cooperating by forming a line and flying inshore, driving a school of fish ahead of them into shallow water. Then the birds have a field day.

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pieces of orange pottery, which matched examples known to date from early 1600's, were found in earth with which the trench was backfilled.

"Croscoe was not more astounded," Dr. Godfrey writes in his report in *ARCHAEOLOGY QUARTERLY* (Summer 1950). His assistant, L. T. Hosmer, and Dr. Godfrey were searching for tool marks in the bottom of the original trench when the footprint was encountered. Made by a square high-heeled shoe, about size 8, it was an attempt to cover a pick mark that the ancient digger had made by mistake. Like a detective in a mystery thriller, Dr. Godfrey photographed his evidence and made a plaster cast.

As clinching evidence, two small fragments of a colonial period clay pipe were found in brown earth with which the accidental pickthrust was filled.

Some of the inhabitants of today's Newport are mutely unhappy about the solution of the Tower's mystery, fearing that it will hurt the tourist business, Dr. Godfrey intimates.

But there is still a problem remaining that needs solution, Dr. Godfrey observes. It is a psychological one: Why was the Tower built?

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ENTOMOLOGY

House Fly vs. Chemicals

► PITY the poor house fly. A quarter of an inch long, he never gets any bigger, cannot buy a gas mask, and goes through life the target of deadly chemicals constantly being improved by six-foot-high scientists.

Now even the weeds and wild flowers are ganging up against him. A scrabbly riverbank weed known as ox-eye has just been found to contain a chemical that makes a potent new insecticide.

So toxic is this substance, a chemical called scabrin, that the Department of Agriculture thinks it may supplant pyrethrum, the tried-and-true insecticide which also comes from a flowering plant. Pyrethrum is the knockdown agent used in most sprays containing DDT, a slow-acting poison.

Scabrin was discovered by an insecticide chemist of the Department of Agriculture,

Martin Jacobson. Not much is known about it yet—except that it can kill the poor, pesky little fly.

The chemical was extracted from the roots of a flowering weed that grows from Maine to New Mexico. The ox-eye plant is a cousin of the sunflower, but the flowers it produces in the fall are not attractive enough for ox-eye to be a garden plant.

Since scabrin occurs in the roots of ox-eye, the weed could be cultivated and harvested mechanically with greater ease than pyrethrum, which is extracted from the flowers of its parent plant.

Although scientific tests must be made to determine whether the new chemical is safe for general use, officials say an important new agricultural crop may be in the making in this country.

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Books of the Week

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BIOLOGICAL FOUNDATIONS OF HEALTH: Proceedings of the Eastern States Health Education Conference, April 1-2, 1948—New York Academy of Medicine—Columbia University Press, 169 p., \$2.50. Essays written in four biological fields: nutrition, psychiatry, geratology and epidemiology.

BIOLOGY: Its Human Implications—Garrett Hardin—Freeman—635 p., illus., \$5.00. An introductory college text.

CENTENNIAL: Collected Papers Presented at the Centennial Celebration, Washington, D. C., Sept. 13-17, 1948—American Association for the Advancement of Science, 313 p., illus., \$5.00. Includes such papers as Donald Menzel's "The Sun and the Earth," T. M. Sonneborn's "The Role of Cytoplasm in Heredity" and L. L. Thurstone's "Primary Mental Abilities."

CROP ROTATION AND TILLAGE EXPERIMENTS AT THE NORTH PLATTE (NEBR.) SUBSTATION 1907-34—L. L. Zook and H. E. Weakly—Govt. Printing Office, U. S. Dept. of Ag. Tech. Bull. No. 1007, 78 p., illus., paper, 25 cents.

ENDOCRINOLOGY: The Glands and Their Functions—R. G. Hoskins—Norton, rev. ed., 402 p., illus., \$5.50. An introduction to the study of hormones and their influence on human life.

MENNONITE COMMUNITY COOKBOOK: Favorite Family Recipes—Mary Emma Showalter—Winston, 494 p., illus., \$3.50 (washable-cover: \$4.50). A collection of 1400 traditional Mennonite recipes.

THE MERCK MANUAL OF DIAGNOSIS AND THERAPY: A Source of Ready Reference for the Physician—Merck, 8th ed., 1592 p., illus., \$4.50 (Thumb-Index Ed.: \$5.00). A hand book for the medical profession stressing diagnosis and treatment of disease with certain basic physiologic and pathologic facts included.

NOMADS OF THE LONG BOW: The Siriono of Eastern Bolivia—Allan R. Holmberg—Govt. Printing Office, Smithsonian Institution Publ. No. 10, 104 p., illus., paper, 65 cents. An anthropological study of the Siriono, a primitive society of Bolivia.

PACIFIC SCIENCE BOARD: Third Annual Report—National Research Council, 154 p., paper, 50 cents.

PLANT VIRUSES AND VIRUS DISEASES—F. C. Bawden—Chronica Botanica, 3rd ed., 335 p., illus., \$6.00. A monograph revised to include the advances of the last six years.

THIRTY-FIRST ANNUAL REPORT OF THE NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS 1945—National Advisory Committee for Aeronautics—Govt. Printing Office, 737 p., illus., \$4.50. Withheld because of war-time restrictions, this report covers the fiscal year 1945 and includes technical reports Nos. 804 to 833. Contains some of the latest aeronautical information.

THIS LAND OF OURS—Maxwell S. Stewart—Public Affairs Committee, Pamph. No. 162, 32 p., illus., paper, 30 cents. A graphic re-

minder to the city-dweller of the importance of soil and water conservation.

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ETHNOLOGY

Brazilian Natives Worry About Revealing Weapons

► IT is not just the presence of the atomic bomb that produces spy scares and makes people worried about the revelation of military secrets to potential enemies.

Dr. Kalervo Oberg, Smithsonian Institution ethnologist, has just brought back reports of very primitive tribes in the Matto Grosso area of Brazil who also worry about their military secrets.

These people are very primitive, Dr. Oberg found. Their painted bodies go completely naked. They live on fish, turtles and wild fruits. But whenever a stranger approaches, their bows and arrows are jealously hidden.

They are highly suspicious of white men and even of their neighbors who have had any contact with white men. Dr. Oberg

is the first white man ever to see these people. The names of the tribes are the Nambiguara and the Terena.

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MEDICINE

Atomic Age Aids Give Brain Tumor Locations Exactly

► AN ATOMIC age technique for locating brain tumors is 95% accurate, Dr. John Martin of Northwestern University Medical School reported to the American Neurological Association meeting in Atlantic City, N. J.

Using this technique, the surgeon injects a radioactive tracer dye into the patient's blood stream. Then a Geiger counter device shaped somewhat like a skull cap is attached to the patient's head and moved over it to 32 different positions. Since the radioactive dye concentrates in the tumor tissue, the counter shows up the location.

The method was also 95% accurate, Dr. Martin reported, in determining the absence of tumors in patients suspected of having them. His findings were made on 200 patients examined at Northwestern Medical School and the VA hospital at Hines, Ill.

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❁ **OYSTER OPENER**, also usable in opening clam shells, is a recently patented device to hold bivalve mollusks and also to guide the blade of an ordinary kitchen knife in separating the shells. Slots in its base and an upright arm hold the butt of the shell.

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❁ **INDOOR PISTOL**, together with a target board, shoots elastic bands for bullets, the board having hinged pieces above which are knocked over if struck. When a target is hit, it falls backward, revealing a picture of an animal head in a cut-out below.

Science News Letter, June 24, 1950

❁ **ANTI-MILDEW** chemical, for use on the sails of yachts, provides protection for two or three years under normal conditions. The odorless material permeates the sail fiber without changing color or feel. Technically, it is a methyl benzyl ammonium cyclopentane carboxylate salt.

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❁ **DOG KENNEL**, shown in the picture, is built and used by an airline company for the shipment of pet animals on passenger planes. Built in two sizes and made of a lightweight metal, they are especially



designed to keep their occupants odorless while aloft.

Science News Letter, June 24, 1950

❁ **FIRE-FIGHTING** nozzle, to distribute firefoam on the flaming parts, is attached to the water hose like the ordinary nozzle but has a side opening for a hose connection to a portable small tank of the foam-forming liquid. The effective mixture

made in the nozzle contains water, firefoam and air.

Science News Letter, June 24, 1950

❁ **AUTOMATIC SWITCH**, to turn street lights on at dusk and off at dawn, has a delay device to prevent action from lightning flashes or bright headlights on automobiles. Its sun-switch, sensitive to the amount of light striking it, is enclosed in a glass watt-hour meter case for easy inspection.

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❁ **COLLAPSIBLE TUBES**, for products ranging from shaving cream to catsup and peanut butter, are machine-made from foil with coatings of plastics on both sides. Different plastics can be used on the inside to meet requirements of different materials to be packaged, giving the tube wider usages.

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❁ **PLYWOOD SUBSTITUTE**, a Swiss invention, is made of random wood wastes, specially ground and screened, with shavings for the outside surface. It forms a warpless board, core and surface being compacted and cured in the same pressing operation.

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Do You Know?

Mount Washington in New Hampshire and Mount Washington in Washington State extend about the same distance above sea level.

School teachers should have some knowledge of heart diseases because about 2% of the school children in the United States have some form of cardiovascular diseases.

Astrophysics is a branch of astronomy which has to do with the chemicals in stars; they are revealed by an analysis of their light rays through the prisms of a spectroscope.

That some form of vegetable life exists on Mars is quite probable, an astronomer recently stated; it would be somewhat like the mosses and lichens on frigid mountain peaks of the earth.

Fluorescent powder or paint on the pull-handles of fire alarm boxes not only make them more visible at night but identify false-alarm ringers by their fluorescent fingers.

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